

Nutritional Interventions to Improve Maternal and Newborn Health and Survival

Program Brief

Malnutrition of women is a serious problem in low-resource settings: an estimated 42 percent of African women are anemic and nearly half of Africans are at risk of iodine deficiency (Piwoz and Preble 2000). Ensuring that women of childbearing age have adequate nutrients—energy, protein, vitamins, and minerals—in their diets is a key aspect of improving maternal and newborn health and survival. One of the best times to do this is during routine antenatal care (ANC), because as many as 80 percent of women in developing countries seek care at an ANC clinic at least once during their pregnancy. The MNH Program recognizes this opportunity and is taking steps to implement and support key nutritional recommendations during ANC visits, as well as during subsequent postpartum and newborn care visits.

Importance of a Balanced Diet

Pregnancy and breastfeeding place great demands on a woman's body, increasing her nutritional needs. In addition to eating extra servings, eating a balanced diet of protein and energy decreases the risk of having a baby who is small for gestational age (Fall et al. 2003). Eating a

high proportion of protein, on the other hand, actually increases this risk and is therefore discouraged (Merialdi et al. 2003).

Supplementation with Select Vitamins and Minerals

In areas that have endemic deficiencies, supplementation with select vitamins and minerals improves the health and survival of mothers and their newborns.

Vitamin A

A trial in Nepal, where vitamin A deficiency is common, found that weekly supplementation of vitamin A reduced pregnancy-related maternal deaths (West et al. 1999). A trial in Indonesia also found that vitamin A supplementation reduced the risk of anemia: anemia was reduced in 35 percent of women who received vitamin A, 68 percent of women who received iron, and 97 percent of women who received both vitamin A and iron (Suharno et al. 1993). When given to breastfeeding mothers during the postpartum period, vitamin A also decreases infant mortality.

MNH Program Recommendations:

Balanced Diet

Nutritional counseling as part of routine ANC should emphasize eating at least one extra serving of staple food per day during pregnancy and two extra servings per day while breastfeeding; eating a balanced diet that contains beans, nuts, starchy foods, animal products, fruits, and vegetables; and eating a variety of foods rich in vitamins and minerals.

Vitamin A Supplementation

Where vitamin A deficiency is endemic, pregnant women should receive vitamin A 10,000 IU daily or 25,000 IU weekly during the second and third trimesters (World Health Organization 1998). Because of the risk of birth defects with higher doses, the dose of vitamin A should never exceed 25,000 IU and should not be given during the first 60 days of pregnancy (Keen et al. 2003). Postpartum women should receive a single dose of 200,000 IU of vitamin A up to 8 weeks postpartum if breastfeeding or up to 6 weeks postpartum if not breastfeeding.

Iron and Folate

Iron deficiency is an important cause of anemia, which increases a woman's risk of death from heart failure and makes her more susceptible to the effects of excessive bleeding during pregnancy and after childbirth (Villar et al. 2003). Antenatal iron supplementation reduces the incidence of anemia during pregnancy and the postpartum period (Suharno et al. 1993; Villar et al. 2001).

Folate is important for fetal development; there is a well-established relationship between supplementation with folate near the time of conception and prevention of neural tube defects in the baby (Costello and Osrin 2003).

Iodine

Iodine deficiency is the leading cause of preventable mental retardation. In countries that do not have a system of fortifying salt with iodine, individual supplementation in areas where iodine deficiency is endemic may be the only available option.

MNH Program Recommendations:

Iron and Folate Supplementation

Women should receive iron (60 mg) plus folate (400 mcg) by mouth once daily throughout pregnancy and for 3 months postpartum. Women should be encouraged to eat foods rich in iron and vitamin C, which aid in absorption of iron, and avoid drinks, such as tea and coffee, which contain tannins and polyphenols and may inhibit absorption of iron.

Iodine Supplementation

Where iodine deficiency is endemic, women should receive two to three capsules of iodine (400 to 600 mg) by mouth, or IM injection of iodine (240 mg; 0.5 mL Lipiodol), as early in pregnancy as possible. Iodine supplementation before conception is preferred so as to ensure adequate iodine levels during fetal brain development in early pregnancy. In addition, women should eat foods rich in iodine and use iodized salt, if available. Women receiving iodine supplementation in the first or second trimester should receive another dose of iodine postpartum.

Newborn Feeding Practices

Breastfeeding should be initiated within the first hour after birth. Babies should be breastfed on demand for the first 6 months and given appropriate complementary feeding thereafter. When replacement feeding is necessary, a commercial breast-milk substitute or other suitable substitute prepared from animal milk should be used. Water used for preparing the substitute should be boiled for 20 minutes and then cooled, and a cup or cup and spoon—but not a bottle, which is difficult to clean—should be used to feed the baby.

Feeding Newborn Babies and Infants

Ensuring proper newborn and infant feeding practices—exclusive breastfeeding or replacement feeding for the first 4 to 6 months followed by appropriate complementary feeding—is critical to reducing newborn morbidity and mortality.

Exclusive Breastfeeding

Exclusive breastfeeding is defined as the provision of breast milk only, without any other food or liquid such as a commercial breast-milk substitute, animal milk, porridge, tea, water, and so on. Breast milk contains all the nutrients a baby needs for the first 6 months and changes over time to meet the baby's changing nutritional demands.

Colostrum, the first milk, also boosts babies' immune systems and helps protect babies from infections and allergies. In developing countries, babies who are not breastfed are 5.8 times more likely to die in the first month of life than breastfed babies (World Health Organization 2000).

Exclusive breastfeeding also benefits the mother. Breastfeeding promotes mother-baby bonding, helps the uterus return to normal size, reduces the risk of anemia by delaying the return of menses, and is cost-effective (Piwoz and Preble 2000). For women less than 6 months' postpartum with no return of menses, exclusive breastfeeding has the added benefit of providing a contraceptive method (lactational amenorrhea method) that is 98 percent effective. Using this or another suitable contraceptive method, a woman can increase her birth interval, which is one of the best ways to reduce newborn mortality and morbidity (Rutstein 2000). During antenatal and postpartum care, women should receive family planning counseling to inform their choice to use a modern contraceptive method.

Replacement Feeding

When breastfeeding is not possible, appropriate replacement feeding—using a commercial or home-prepared breast-milk substitute—must be used. Safe water and

clean utensils are critical for proper preparation and feeding of the substitutes.

Practicing Proper Hygiene

Poor hygiene can lead to diarrhea, which results in the loss of nutrients. Improving water quality by boiling water for 20 minutes reduces the prevalence of diarrheal disease by up to 20 percent, and handwashing after performing any task that potentially contaminates hands, such as using the toilet or changing a baby, can reduce diarrheal diseases by about 45 percent. Handling food properly is another important way to prevent infections and diarrhea.

Preventing and Treating Infections

Infections deplete the body of nutrients, while nutrient deficiencies decrease the body's resistance to infection. Three infections that have significant effects on maternal and newborn health and survival are HIV/AIDS, malaria, and hookworms.

HIV/AIDS

General nutrition

Nutritional deficiencies affect the body's immune system in ways that may increase HIV disease progression and mortality. Malnutrition during pregnancy may increase the risk of mother-to-child transmission (MTCT) of HIV, and anemia is associated with progression of HIV disease and a two- to four-fold increased risk of death (Piwoz and Preble 2000). Antenatal nutritional supplementation for HIV-positive women can significantly reduce the incidence of births of preterm and low birthweight babies (Fawzi et al. 1998). The interaction between HIV/AIDS and malaria also increases the risk of low birthweight, preterm birth, and maternal anemia, making nutritional supplementation particularly important for women who have both infections.

Breastfeeding

As many as 20 percent of babies may be infected with HIV through breastfeeding. Exclusive breastfeeding for 4 to 6 months followed by abrupt weaning may reduce the

MNH Program Recommendations:

Hygiene

Clean, safe water should be readily available for drinking and preparation of breast-milk substitutes. Women should wash their hands frequently, especially after performing any task that can contaminate their hands, and practice safe handling of food.

HIV

Women who are HIV-negative or do not know their status should be encouraged to exclusively breastfeed their babies. Women who are HIV-positive should be given information on feeding options and supported in the method of feeding they choose. For mothers who choose to breastfeed, exclusive breastfeeding for 4 to 6 months must be stressed, and proper breastfeeding technique and good breast health are critical. For mothers who choose to use replacement feeding, the acceptability, affordability, feasibility, and sustainability of the method—as well as the mother's ability to safely prepare the substitute—should be ensured. In addition, the use of antiretroviral drug therapy for preventing MTCT is recommended.

Malaria and Hookworm Infections

For prevention of malaria during pregnancy, women should consistently use insecticide-treated bednets and access to intermittent preventive treatment during ANC. The current World Health Organization recommendation for intermittent preventive treatment is three tablets of sulfadoxine 500 mg plus pyrimethamine 25 mg given at the first ANC visit after fetal movement begins (not before 4 months' gestation) and at the next two ANC visits (but not more often than monthly) until childbirth. In areas endemic for hookworm, presumptive treatment in the second or third trimesters should consist of mebendazole 500 mg or albendazole 400 mg by mouth once, or mebendazole 100 mg by mouth twice daily for 3 days.

risk of MTCT by protecting the lining of the baby's digestive system and promoting the baby's resistance to infection. In addition, the use of antiretroviral drugs can further decrease the risk of MTCT to babies who are breastfed.

In 2002, the World Health Assembly adopted a new position on feeding that emphasizes a mother's right to information and support that will enable her to make fully informed decisions about the best method of feeding her baby (World Health Assembly 2002).

Among women who are HIV-negative or do not know their status, exclusive breastfeeding should be promoted and supported; women who are HIV-positive should be given information on feeding options and supported in the method of feeding they choose. Proper breastfeeding technique and

breast care are critical: HIV-positive women with mastitis have more HIV virus in their breast milk and increased rates of MTCT at 6 weeks and 12 months than do HIV-positive women without mastitis (Semba et al. 1999).

Malaria and Hookworm Infections

Malaria and hookworm infections contribute significantly to maternal anemia. Malaria affects more than 90 countries and causes 300 to 500 million infections and almost one million deaths every year. The malaria parasite can cause anemia, spontaneous abortion, kidney failure, and high fever in women, as well as stillbirth, low birthweight, or congenital malaria in babies. Infection with hookworms causes blood loss from the digestive system, interferes with absorption of nutrients, and decreases appetite, all of which can worsen anemia and malnutrition. Ensuring supplementation of iron and other micronutrients, such as vitamin A and folate, in addition to counseling about prevention and treatment for malaria and hookworms during pregnancy, can help prevent anemia and adverse pregnancy outcomes (Steketee 2003).

Conclusion

The impact of nutritional deficiencies and infections on maternal and newborn health and survival is clear. The MNH Program recognizes that prevention and treatment of these problems are successful when part of routine ANC services, because a significant proportion of women in developing countries attend at least one ANC visit during their pregnancy. The MNH Program's strategy of incorporating nutritional interventions within ANC, as well as during subsequent postpartum and newborn care visits, is likely to reach a high proportion of pregnant women and substantially improve maternal and newborn health and survival.

References

- Costello AM and D Osrin. 2003. Micronutrient status during pregnancy and outcomes for newborn infants in developing countries. *J Nutr* 133(5 Suppl 2): 1757S–1764S.
- Fall CHD et al. 2003. Micronutrients and fetal growth. *J Nutr* 133(5 Suppl 2): 1747S–1756S.

- Fawzi WW et al. 1998. Randomised trial of effects of vitamin supplements on pregnancy outcomes and T cell counts in HIV-1-infected women in Tanzania. *Lancet* 351(9114): 1477–1482.

- Keen CL et al. 2003. The plausibility of micronutrient deficiencies being a significant contributing factor to the occurrence of pregnancy complications. *J Nutr* 133(5 Suppl 2): 1597S–1605S.

- Kramer MS and R Kakuma. 2003. Energy and protein intake in pregnancy. (Cochrane review), in *The Cochrane Library*, Issue 4, 2003. John Wiley & Sons, Ltd.: Chichester, UK.

- Merialdi M et al. 2003. Nutritional interventions during pregnancy for the prevention or treatment of impaired fetal growth: an overview of randomized controlled trials. *J Nutr* 133(5 Suppl 2): 1626S–1631S.

- Piwoz EG and EA Preble. 2000. HIV/AIDS and nutrition. A review of the literature and recommendations for nutritional care and support in sub-Saharan Africa. SARA Project: Washington, DC.

- Rutstein S. 2000. Effects of birth interval on mortality and health: Multivariate cross-country analysis. MACRO International presentation at U.S. Agency for International Development. Washington DC, July.

- Semba RD et al. 1999. Human immunodeficiency virus load in breast milk, mastitis, and mother-to-child transmission of human immunodeficiency virus type 1. *J Infect Dis* 180(1): 93–98.

- Steketee RW. 2003. Pregnancy, nutrition and parasitic diseases. *J Nutr* 133(5 Suppl 2): 1661S–1667S.

- Suharno D et al. 1993. Supplementation with vitamin A and iron for nutritional anaemia in pregnant women in West Java, Indonesia. *Lancet* 342(8883): 1325–1328.

- Villar J et al. 2003. Nutritional interventions during pregnancy for the prevention or treatment of maternal morbidity and preterm delivery: an overview of randomized controlled trials. *J Nutr* 133(5 Suppl 2): 1606S–1625S.

- Villar J et al. 2001. WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *Lancet* 357(9268): 1551–1564.

- West Jr KP et al. 1999. Double blind, cluster randomised trial of low dose supplementation with vitamin A or beta carotene on mortality related to pregnancy in Nepal. *BMJ* 318(7183): 570–575.

- World Health Assembly. 2002. Fifty-Fifth World Assembly. Agenda item 13.10. WHA resolution 55.25. Infant and young child nutrition.

- World Health Organization. 2000. WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. *Lancet* 355(9202): 451–455.

- World Health Organization. 1998. Safe vitamin A dosage during pregnancy and lactation. Recommendations and report of a consultation. WHO/NUT/98.4. World Health Organization: Geneva.

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This publication was made possible through support provided by the Maternal and Child Health Division, Office of Health, Infectious Diseases and Nutrition, Bureau for Global Programs, U.S. Agency for International Development, under the terms of Award No. HRN-A-00-98-00043-00. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.